Bridge No. _____

Job No. _____

Missouri Department of Transportation
Bridge Hydraulics and Scour Report

Designer _____ Date _____

Route _____ County _____ Stream _____

Purpose of Hydraulic/Scour Study
(write a brief statement describing project and purpose of hydraulic study)

National Flood Insurance Program Information

Has a flood insurance study been performed for the community? *(www.fema.gov/home/fema/csb.htm)*

Is the bridge in a special flood hazard area? *(If yes, a floodplain development permit will be required)*

Is the bridge in a designated floodway? *(If yes, a no-rise certification will be required)*

Has a Flood Insurance Rate Map (FIRM) been published for the area?

What is the insurance rating for the site (A1, B, C, etc.)?

Base (100-yr) Flood Elevation _____ Floodway width _____

Map panel number _____ Map date _____

Additional comments on Flood Insurance Study:

Design Flow

Design Frequency _____ (years)   Drainage Area _____ (mi^2)

Avg. slope between points 10% and 85% of valley length upstream _____ (ft/mi)

Method of Analysis (choose one or more)		Q_{des}	Q_{500}
Missouri Rural USGS regression equations	Region = _____		
Missouri Urban (BDF) regression equations	BDF = _____		
Missouri Urban (%I) regression equations	% Impervious Area = _____		
Stream Gage	USGS Station Number = _____		
FEMA Flood Insurance Study	Community Name = _____		
Other (Describe method)	_____		

Design Flow _____ (cfs)   500-year flow _____ (cfs)

Additional comments on design flow calculations: *(method chosen and why, expected level of upstream development, etc. Note: Include 100-year discharge if Design Frequency is not 100-year)*

Observed Extreme High Water

Elevation _____ (ft) Location _____ Date _____

Comments on Observed Extreme High Water: *(discharge, if known, etc.)*

Discuss flow conditions in reach and describe any existing conditions that may influence hydraulic behavior in reach:

Streambed Slope

USGS Topo map: _____ Quadrangle(s)

Contour Interval = _____ Distance between contours = _____

Streambed Profile: Change in elevation = _____ Change in station = _____

Streambed Slope = _____ (ft/ft)

Water Surface Profile Model

Model used:

☐ River Analysis System (HEC-RAS) ☐ HEC-2

☐ Bridge Backwater Analysis (WSPRO) ☐ Other (describe)

Which cross section was in the model and why?

Describe the channel/overbank conditions and the roughness coefficents chosen:

Describe the existing and proposed bridges and the method used to model them: *(Bridge loss calculation method, pier loss coefficients, etc.)*

Water Surface Profile Model Results

	Existing Conditions		Proposed Conditions	
	Design Flow	Q_{500}	Design Flow	Q_{500}
High Water Surface Elevation at Bridge (ft)	N/A	N/A		
Maximum Backwater (ft)				
Average Velocity in channel through Bridge (ft/s)				
Average Velocity through Bridge Opening (ft/s)				
Freeboard (ft)				
% of flow overtopping road				
Bridge overtopped?				

Overtopping Discharge _____ (cfs) Overtopping Frequency _____

Additional comments on water surface profile model: *(backwater, velocities, unusual conditions, model errors, etc. Note: Provide high water surface elevation and maximum backwater for the 100-year discharge if Design Frequency is not 100-year.)*

Describe files used in water surface profile model: *(HEC-RAS project and plan descriptions, WSPRO filenames and descriptions, etc.)*

Scour Calculations

General Information: *(Describe soil conditions in streambed and overbanks:)*

Comments on Contraction Scour calculations: *(Note: Contraction scour depths greater than 2.0 meters should be viewed with some degree of skepticism.)*

Comments on Pier Scour calculations: *(Does the scour modeling account for the expected footing, was drift considered in determining pier widths, etc?)*

Comments on Abutment Scour calculations:

Scour Calculation Results

	Calculated Scour Depths (ft)	
	Design Flow	**500-year Flow**
Contraction Scour		
Pier Scour		
Left Abutment Scour		
Right Abutment Scour		

Scour Protection Measures

What measures are required to protect against scour?

Additional comments on scour calculations and/or scour protection:

General Information

Are there any improvements/buildings/crops/livestock that might be affected by alterations to the floodplain?
(include description and estimated value)

Special Considerations: *(Describe any other special conditions or considerations which affect this project)*

Bridge Layout Summary

Span Layout _____

Loading _____ Roadway Width _____ Skew _____ Alignment _____

Fill exception: Sta. _____ To Sta. _____

Design Variances: *(Provide an explanation of any design variances requested and approved for this project)*

Hydraulic Analysis Summary

Design Flood Data:

Design Frequency _____ Design Discharge _____ (cfs)

Design High Water Surface Elevation _____ (ft) Backwater _____ (ft)

Waterway Area below D.H.W. _____ (ft^2) Average Velocity thru Opening _____ (ft/s)

Basic (100-yr.) Flood Data (if design flood other than 100 year):

Discharge _____ (cfs) Water Surface Elevation _____ (ft)

Overtopping Discharge Data:

Overtopping Discharge _____ (cfs) Overtopping Frequency _____ (year)